

REMARKS

Applicants appreciate the thoroughness with which the Examiner has examined the above-identified application. Reconsideration for an allowance is requested in view of the amendments above and the remarks below.

Rejections under 35 U.S.C. § 112

The Examiner has rejected claims 1-5 and 21 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention. Specifically, the Examiner states that the preamble of the claims "provide for an apparatus, however the claimed limitations set for features of an article." Office Action, December 28, 2006, p.2.

Applicants have amended the claims to change the word "apparatus" to "article"; however, applicants respectfully submit that the term "apparatus" would be just as appropriate. An apparatus claim of a patent covers a product, machine, or structure. J. Thomas McCarthy, McCarthy's Desk Encyclopedia of Intellectual Property (2d Ed. 1996). "An apparatus claim covers what a device *is*, and not what a device *does*." Hewlett-Packard Co. v. Bausch & Lomb Inc., 909 F.2d 1464, 1468, 15 USPQ2d 1525, 1528 (Fed. Cir. 1990) (J. Rich) (emphasis in original).

Applicants submit that the amendment to the claim preamble does not in any way narrow the claim or restrict the scope of the claim coverage.

Rejections under 35 U.S.C. § 103

Claims 1-5 and 21 stand rejected under 35 U.S.C. § 103(a) as being obvious from Chittipeddi, et al. (U.S. Patent No. 6,472,304), in view of Sakane, et al. (Japan Patent No. JP 56-017048). Applicants respectfully traverse this rejection.

Chittipeddi teaches a wire bonding of wires to an aluminum bond pad in a semiconductor integrated circuit. Chittipeddi separates the aluminum bond pad from a copper plug by a barrier layer.

A lithographic mask 53 is then applied to the etch layers 51 and 52 to define the aluminum bonding pad, as shown in Fig. 17, and the unwanted portions of these layers are etched [sic] away using conventional techniques to produce the bonding pad 56, separated from the copper plug by barrier layer 55 as shown in Fig. 18.

Chittipeddi, col. 3, ll.26-31.

Then a gold or gold alloy wire (61) is bonded to the aluminum pad (56) by thermocompression bonding. Chittipeddi, col. 3, ll.44-47. Chittipeddi does not teach, disclose, or suggest forming a resultant alloy material between the interconnect and the metallic wire on the semiconductor substrate.

The present invention requires an alloying element cap 20 to be placed on a copper interconnect 12. Specification, p.9, ll.9-12. When a gold wire is attached, the combination of the gold wire and the alloying element cap forms a resultant alloy 26. Chittipeddi is completely silent regarding any formation of a resultant alloy that includes a composition of the metallic wire material and the alloying metal.

The Examiner combines Chittipeddi with Sakane (JP 56-017048) to "form a low temperature alloy material including Au-Sn or Au-In between the gold wire and the alloy

metal." Office Action, December 28, 2006, p.3. Applicants respectfully disagree with this combination.

Sakane teaches coating a lead frame. An alloy is plated on the surface of the body of a lead frame, allowing the configuration to be solderable and adhere with resin at the time of die bonding. Sakane, Abstract. Sakane does not teach or disclose bonding an integrated circuit chip to a semiconductor substrate with an alloying material that can combine with the wires to form a resultant alloy on the semiconductor substrate. In light of this, applicants respectfully submit that the combination of Chittipeddi with Sakane is improper. Sakane does not teach adding an alloy layer to a semiconductor substrate in order to form a resultant alloy on the substrate when a wire is bonded to the metal interconnect (which is also formed on the substrate). Sakane coats a lead frame, which is separate and distinct from an integrated circuit. Chittipeddi teaches wire bonding (without a resultant alloy) on an integrated circuit chip. There is no suggestion to treat the formation various layers of an integrated circuit chip with those process steps used for treating a lead frame to which an integrated circuit chip attaches. The proper combination of the two prior art inventions cannot achieve the results of the claimed invention.

The present invention teaches the bonding of a metallic wire material to a metallic interconnect within a substrate by forming a resultant alloy. Claim 1. Neither Chittipeddi or Sakane teach, disclose, or suggest, forming a resultant alloy on a semiconductor substrate. Applicants submit that the suggestion to make the claimed structure, and the reasonable expectation of success there-from, must be founded in the prior art, not in Applicants' own disclosure. In re Vaech, 20 USPQ2d 1438 (Fed. Cir. 1991). The cited references must suggest doing what Applicants have done, and not in retrospect. In re Skoll, 187 USPQ

481 (CCPA 1975). Applicants submit that the Chittipeddi patent does not suggest doing what applicants have done, and in fact, does not suggest in any manner whatsoever of forming a resultant alloy material from its wire bond on a semiconductor substrate. Furthermore, the prior art of Sakane does not teach, suggest or disclose the formation of a resultant alloy on an integrated circuit chip. Thus, applicants' invention would only be found based on applicants' own disclosure, which of course is improper as a hindsight reconstruction of applicants' invention. Id., W.L. Gore & Associates, Inc. v. Garlock, Inc., 721 F.2d 1540, 1553, 220 USPQ 303, 312-13 (Fed. Cir. 1983) (Hindsight based on reading of the patent in issue may not be used to aid in determining obviousness). Likewise, hindsight and the level of ordinary skill in the art may not be used to supply a component missing from the prior art references. Al-Site Corp. v. VSI International, Inc., 174 F.3d 1308, 1324, 50 USPQ2d 1161, 1171 (Fed. Cir. 1999). "It is insufficient that the prior art disclosed the components of the patented device, either separately or used in other combinations; there must be some teaching, suggestion, or incentive to make the combination made by the inventor." Northern Telecom Inc. v. Datapoint Corp., 908 F.2d 931, 934, 15 USPQ2d 1321, 1323 (Fed. Cir. 1990).

Applicants respectfully submit that the claims of the present invention remain patentably distinct over the cited prior art of Chittipeddi and Sakane.

It is respectfully submitted that the application has now been brought into a condition where allowance of the entire case is proper. Reconsideration and issuance of a notice of allowance are respectfully solicited.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "R. Curcio", written over a horizontal line.

Robert Curcio
Reg. No. 44,638

DeLIO & PETERSON, LLC
121 Whitney Avenue
New Haven, CT 06510-1241
(203) 787-0595